

The Advanced X-ray Spectroscopy and Imaging Observatory (AXSIO)

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Following recommendations from the 2010 “New Worlds, New Horizons” (NWNH) report, the Advanced X-ray Spectroscopy and Imaging Observatory (AXSIO) concept streamlines the International X-ray Observatory (IXO) mission to concentrate on the science objectives that are enabled by high-resolution spectroscopic capabilities. AXSIO will trace orbits close to the event horizon of black holes, measure black hole spin for tens of supermassive black holes (SMBH), use spectroscopy to characterize outflows and the environment of AGN during their peak activity, observe SMBH out to redshift $z=6$, map bulk motions and turbulence in galaxy clusters, find the missing baryons in the cosmic web using background quasars, and observe the process of cosmic feedback where black holes and supernovae inject energy on galactic and intergalactic scales. These measurements are enabled by a 0.9 sq m collecting area at 1.25 keV, a microcalorimeter array providing high-resolution spectroscopic imaging and a deployable high efficiency grating spectrometer. AXSIO delivers a 30-fold increase in effective area for high resolution spectroscopy. The key simplifications are guided by recommendations in the NWNH panel report include a reduction in focal length from 20m to 10m, eliminating the extendable optical bench, and a reduction in the instrument complement from six to two, avoiding a movable instrument platform. A focus on spectroscopic science allows the spatial resolution requirement to be relaxed to 10 arc sec (with a 5 arc sec goal). These simplifications decrease the total mission cost to under the \$2B cost to NASA recommended by NWNH. AXSIO will be available to the entire astronomical community with observing allocations based on peer-review.